

Docket No.: 50059-048



#20 Appeal Brief
PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

5/1/02

In re Application of

Hideo SAMURA

Serial No.: 09/343,092

Group Art Unit: 2855

Filed: June 30, 1999

Examiner: C. Dickens

Adm th

For: HEAD FOR INK-JET PRINTER HAVING PIEZOELECTRIC ELEMENTS PROVIDED FOR EACH INK NOZZLE (AS AMENDED)

APPEAL BRIEF

Commissioner for Patents
Washington, DC 20231

Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed February 26, 2002.

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REAL PARTY IN INTEREST

The real party in interest is Kansai Research Institute, Inc. (previously KRI International, Inc.)

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RELATED APPEALS AND INTERFERENCES

Appellant is unaware of any related appeals and/or interferences.

STATUS OF CLAIMS

Claims 1, 4-7, and 11-12 stand finally rejected. It is from the final rejections of these claims that this Appeal is taken. Claims 3 and 8-10 ~~are hereby~~ ^{have been} cancelled without prejudice or disclaimer.

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STATUS OF AMENDMENTS

There are no outstanding amendments.

SUMMARY OF INVENTION

In one aspect, the invention relates to a head for ink-jet printer comprising a silicon substrate (1) on which a plurality of ink nozzles (5) and a plurality of ink passages (6) each communicating separately to each of the ink nozzles are processed finely using a plasma etching method (see, e.g., Figs. 1 and 2; page 7, lines 13-23; page 8, lines 23-24). An inorganic substrate (2) is joined with the silicon substrate and includes ink chambers (7), each communicating separately to each of the ink passages (6) (see, e.g., Figs. 1 and 2; page 7, line 24 to page 8, line 5). A piezoelectric element (4) of ferroelectric substance (8) is provided for changing separately a capacity of each of the ink chambers (7) to jet an ink from the ink nozzles (5) through the ink chambers (7) (see, e.g., page 7, lines 15-20 and page 8, lines 17-22). In accord with the invention, ink passages (6) are fine, as compared with the ink chambers (7), and ink nozzles (5) are fine, as compared with ink passages (5) (see, e.g., Fig. 1; page 8, lines 23-24; page 10, lines 22-24; page 13, lines 15-23).

ISSUE

Whether the obviousness rejection of claims 1, 4-7, 11 and 12 under 35 U.S.C. § 103(a) over **Shimada** (U.S. Patent No. 5,825,121), **Usui** (U.S. Patent No. 6,134,761) and **JP 10-86365** is proper.

GROUPING OF CLAIMS

Claims 1, 4-7, 11 and 12 stand or fall together.

THE ARGUMENT

Claim 1 and claims 4-7, 11, and 12 dependent thereon relate to a head for an ink-jet printer comprising a silicon substrate on which a plurality of ink nozzles and a plurality of ink passages, each communicating separately to each of the ink nozzles, are finely formed using a plasma etching method. The ink passages are fine as compared with the ink chambers and the ink nozzles are fine as compared with the ink passages. This construction, employing silicon as a material of the substrate on which the ink nozzles and ink passages are both formed using plasma etching, permits formation of a high nozzle density structure (i.e., a fine spacing between nozzles) to permit a high print quality.

The Examiner continues to allege **Shimada** provides ink nozzles 210, ink passages 204, ink chambers 203, and piezoelectric elements 208 and alleges **JP 10-86365** provides a piezoelectric element comprising a thin film of a ferroelectric substance.

The Examiner acknowledges **Shimada** does not provide specific dimensions or relative dimensions of the ink nozzles, passages, or chambers, and does not provide for a plurality of laminated silicon substrates. **Usui** is said to make up for this deficiency and is alleged to provide ink passages 10 that are fine in relation to the ink chambers 4 and tapered ink nozzles 28 are fine in relation to the ink passages 10. The Examiner also alleges, *equating ceramic substrates to silicon substrates*, that **Usui** provide lamination of plural ceramic substrates for the purpose of increasing the mechanical strength of the flow path forming member in an ink jet head (see col. 7, line 63 to col. 8, line 46).

Usui is alleged to teach or suggest “the lamination of plural ceramic substrates, i.e., silicon, (7, 8, 11)(col. 7, lines 63-67 - col. 8, lines 1-46)”. However, Appellants respectfully submit that, as known

to those skilled in the art, “ceramic” does not include silicon. **Usui** discloses a ceramic ink jet head, wherein the elastic board 2 is ceramic and the pressure-generating-chamber forming member 7 is ceramic (see col. 7, lines 64-67). More precisely, **Usui** teaches that both the elastic board 2 and the pressure-generating-chamber forming member 7 are made from zirconium oxide (ZrO_2), also known as zirconia (see col. 3, lines 25-29). Further, the spacer 7, lid member 8, and flow path regulating board are all made of zirconia (green sheets) (see, e.g., col. 3, line 36 to col. 4, line 18), which are stacked and sintered to form a flow path forming member (see col. 4, lines 14-18). **Usui** explicitly provide that “the green sheets which are used to form the flow path forming member are substantially equal in composition to one another, and are sintered at the same time” (col. 8, lines 34-37).

Usui also provide that nozzle plate 27 is made of stainless steel. Specifically, **Usui** asserts that “Reference numeral 27 designates a nozzle plate made of a metal such as a stainless steel plate which shows a high corrosion resistance against ink. The nozzle plate 27 has the aforementioned nozzle openings 28 in correspondence to the pressure generating chambers 4” (see col. 4, lines 19-21; see also Figures 1 and 2). Similarly, **Usui** recite that “nozzle plate 27 is prepared by forming the nozzle openings 28 in a metal plate such as a stainless steel plate which is corrosion-resistant against ink” (col. 5, lines 57-59). **Usui** also state “the nozzle plate 27 is prepared by forming the nozzle openings 28 in a metal plate such as a stainless steel plate” (see col. 7, lines 1-3).

Appellants respectfully submit that the requisite motivation to support the ultimate legal conclusion of obviousness under 35 U.S.C. §103 must stem from the applied prior art, as a whole, and must have realistically impelled one having ordinary skill in the art to modify a specific reference in a specific manner to arrive at a specifically-claimed invention. *In re Newell*, 891 F.2d 899, 13 USPQ2d 1248 (Fed. Cir. 1989).

Case law cautions against focusing on the obviousness of the *differences* between the claimed

invention and the prior art rather than on the obviousness of *the claimed invention as a whole*, as § 103 and *Graham v. Deere* require. See, e.g., *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 231 USPQ 81, 93 (Fed. Cir. 1986). “The question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious” *Stratoflex Inc. v. Aeroquip Corp.*, 713 F.2d 1530 (Fed. Cir. 1983)(emphasis in original). “[I]t is this invention *as a whole*, and not some part of it, which must be obvious under 35 U.S.C. § 103”. *In re Antonie*, 559 F.2d 618, 620 (CCPA 1977)(emphasis in original).

Appellant submits, in view of the above remarks, that **Usui** does not teach or suggest “a silicon substrate on which a plurality of ink nozzles and a plurality of ink passages each communicating separately to each of the ink nozzles are processed finely using a plasma etching method”, as required by rejected claims 1, 4-7, 11 and 12. Appellant submits **Shimada** and **JP 10-86365** similarly do not teach or suggest this feature of the claimed invention. **Shimada** specifically calls for a single-crystalline Si substrate 201 connected to a glass substrate 202. It is in the glass substrate that ink channels 204 and an ink fountain 205 are provided (see col. 5, lines 8-10; Figs. 2(a)-2(b)). **Shimada** contains absolutely no mention or suggestion of “a silicon substrate on which a plurality of ink nozzles and a plurality of ink passages each communicating separately to each of the ink nozzles are processed finely using a plasma etching method”, as claimed, and **JP 10-86365** is silent as to this aspect of the invention.

In Paper No. 17, reference numeral 6 (pages 2-3), the Examiner takes the position that there is no meaningful distinction between silicon, glass, or ceramics and argues **Shimada** teaches “a glass, i.e., silicon, substrate 202 on which a plurality of ink nozzles and a plurality of ink passages each communicating separately to each of the ink nozzles” and argues **Usui** teaches “lamination of plural ceramic substrates, i.e., silicon.” However, Appellant respectfully submits that the Examiner is

improperly distilling the invention down to a “gist” or “thrust” and improperly disregards the requirement of analyzing the subject matter “as a whole”. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540 (Fed. Cir. 1983). The prior art must teach or suggest all of the claim limitations. “All words in a claim must be considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 424 F.2d 1382, 1385 (CCPA 1970).

In the case at hand, Appellants submit that the Examiner is improperly relying on equivalence as a rationale supporting the obviousness rejection. In order to rely on equivalence as a rationale supporting the obviousness rejection, the equivalency must be recognized in the prior art, and cannot be based on applicant’s disclosure or the mere fact that the components at issue *may* be functional or mechanical equivalents. *In re Ruff*, 256 F.2d 590 (CCPA 1958); *In re Scott*, 323 F.2d 1016 (CCPA 1963) (Claims were drawn to a hollow fiberglass shaft for archery and a process for the production thereof where the shaft differed from the prior art in the use of a paper tube as the core of the shaft as compared with the light wood or hardened foam resin core of the prior art. Although the Board found the claimed invention would have been obvious, the court reversed, holding that components which are functionally or mechanically equivalent are not necessarily obvious in view of one another and, in this case, held the use of a light wood or hardened foam resin core does not fairly suggest the use of a paper core).

Still further, the Examiner has not demonstrated that **JP 10-86365, Shimada, and Usui** themselves teach or suggest the suitability of silicon for the intended use of both ink passages and ink nozzles for a ink-jet printer head sufficient to support a *prima facie* obviousness determination in accord with *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327 (1945). Therefore, Appellant respectfully submits that the Examiner is improperly relying upon “official notice” of facts outside of the record. The Examiner may only take official notice of facts outside of the record which are capable

of instant and unquestionable demonstration of being “well-known” in the art. *In re Ahlert*, 424 F.2d 1088, 1091 (CCPA 1970). Appellants traverse the Examiner’s use of facts outside the record and request documentary support showing, for example, that plasma processing is equally effective in glass, ceramic, and silicon. In accord with *In re Boon*, Appellant submits that if ceramics or glass are indeed equivalent or interchangeable, as suggested by the Examiner, then why does the semiconductor industry utilize silicon wafers for microprocessor and memory applications, as opposed to glass? 439 F.2d 724 (CCPA 1971). Why are windows made of glass, as opposed to ceramic? What would happen to the Space Shuttle if the ceramic tiles were replaced with glass or silicon? The answer is that the materials are not *necessarily* interchangeable and a determination of obviousness should include consideration of whether or not the applied art or the knowledge available to one skilled in the art at the time of the invention would have suggested and supported use of the claimed material. *for a specific application*. The Examiner is charged to ascertain what would have been obvious to one of ordinary skill in the art at the time the invention was made, and not to the inventor, a judge, a layman, those skilled in the remote arts, or to geniuses in the art at hand. *Environmental Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693 (Fed. Cir. 1983). The Examiner has failed to produce *evidence of* an art recognized suitability of silicon for the intended use of both ink passages and ink nozzles, or even for the nozzle plate (as noted above, **Shimada** provide a glass substrate with ink channels 204 and an ink fountain 205 and **Usui** teaches a ceramic or steel nozzle plate 27 having nozzles 28 (see, e.g., col. 4, lines 19-21; col. 5, lines 57-59; col. 7, lines 1-3; col. 8, lines 18-20)). Moreover, **Shimada** use a single-crystalline silicon substrate for the thin film piezoelectric device, but chooses, for an unstated but obviously compelling reason, to use *glass* for the ink passages and nozzles.

For at least the above reasons, Appellant respectfully submits that the applied combination of **Shimada**, **JP 10-86365**, and **Usui** does not teach or suggest each and every aspect of the claimed

invention and further submits that the Examiner has failed to establish a legally sufficient *prima facie* case of obviousness. Appellant requests reversal of the 35 U.S.C. § 103(a) rejection of claims 1, 4-7, 11 and 12.

CONCLUSION

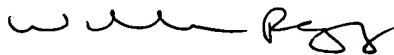
The failure of the Examiner to properly support a *prima facie* case of obviousness under 35 U.S.C. §103 compels the conclusion that one having ordinary skill in the art would not have found the claimed invention *as a whole* obvious within the meaning of 35 U.S.C. §103. *In re Piasecki*, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984).

PRAYER FOR RELIEF

Appellant respectfully submits that the previously argued shortcomings in the objective evidence presented by the Examiner underscores the lack of a factual basis and want of the requisite realistic motivation to generate a *prima facie* basis to deny patentability to any of the claims under 35 U.S.C. §103. Appellant, therefore, respectfully solicits the Honorable Board to reverse the Examiner's rejection under 35 U.S.C. §103.

Respectfully submitted,

MCDERMOTT, WILL & EMERY



William D. Pegg
Registration No. 42,988

600 13th Street, N.W.
Washington, DC 20005-3096
(202) 756-8000 WDP:lnm
Date: April 25, 2002
Facsimile: (202) 756-8087

APPENDIX

1. A head for ink-jet printer comprising:

a silicon substrate on which a plurality of ink nozzles and a plurality of ink passages each communicating separately to each of the ink nozzles are processed finely using a plasma etching method;

an inorganic substrate which is joined with said silicon substrate and is provided with ink chambers each communicating separately to each of the ink passages; and

a piezoelectric element of ferroelectric substance for changing separately a capacity of each of the ink chambers to jet an ink from said ink nozzles through said ink chambers;

wherein said ink passages are fine as compared with said ink chambers and said ink nozzles are fine as compared with said ink passages.

4. The head for ink-jet printer according to claim 1, wherein said ink nozzles have tapered configurations.

5. The head for ink-jet printer according to claim 1, wherein said silicon substrate has a construction in which plural silicon substrates are laminated.

6. The head for ink-jet printer according to claim 5, wherein said ink nozzles and said ink passages are communicated by laminating the silicon substrate in which said ink nozzles are processed and the silicon substrate in which said ink passages are processed.

7. The head for ink-jet printer comprising:

the head for ink-jet printer as defined in claim 1; and

an ink tank for storing ink supplied to said ink chambers of said printer head.

11. A head for ink-jet printer according to claim 1, wherein said ink passages have a cross-sectional area less than a cross-sectional area of said ink chambers, and wherein said ink nozzles have a cross-sectional area less than a cross-sectional area of said ink passages.

12. A head for ink-jet printer according to claim 1, wherein a pitch of the ink nozzles is approximately 20 μm .